

Jordan University of Science and Technology

Effectiveness of Benzotriazole as Corrosion Protection Material for Steel Reinforcement in Concrete

Authors: Ababneh, A.N, Sheban, M.A., Abu-Dalo, M.A

Abstract: This paper presents results of an experimental investigation on the effectiveness of benzotriazole (BTA) as anticorrosion material for steel reinforcement in concrete structures. BTA is used in three different corrosion-protection systems: BTA inhibition, BTA coating, and BTA as a hybrid system. Reinforced concrete beams were cast, exposed to a 3% sodium chloride solution, and subjected to drying and wetting cycles to accelerate the corrosion attack. Electrochemical measurement techniques were used to evaluate the corrosion behavior of reinforcement. These measurements include macrocell corrosion current, linear polarization resistance (LPR), corrosion potential (E_{corr}), and electrochemical impedance spectroscopy (EIS). Chloride penetration profiles for the concrete cover and visual inspection of the reinforcing steel bars were also obtained. The results show that a BTA-steel complex film was formed on the steel bar. This film improves the corrosion resistance of the reinforcing steel. Second, the application of the BTA as a coating system showed better results than the inhibition system. Finally, the results indicated that mixing both systems to form a BTA hybrid system was the best, and it provided higher corrosion resistance and a lower corrosion rate.